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steam engine judiciously constructed, was practically demonstrated some time ago by S. P. Langley. More would, therefore, be expected from the gas engine, if constructed with equal forethought. I have always had some misgivings, however, as to whether these experiments, into which so much devoted labor was put, actually met the real issue involved. It seemed to me that they proved that the power available in case of the ordinary engine is just about sufficient to maintain flight and no more; whereas a really practical machine should be provided with a motor whose output of work per second and per kilogram of weight, could be made enormously to exceed the demands upon it, under conditions of smooth soaring.

If one is in search of a maximum of power combined with a minimum of weight, one involuntarily looks to some form of modern explosive and in particular to those which can be worked up into wicks or ribbons. These could be adapted for use in connection with the rocket principle which has so frequently stimulated the imagination of inventors, in a way to require the least amount of subsidiary mechanism. In fact, such expansion is virtually its own propellor. The only question is, how can this quite prohibitively excessive power be controlled. In other words, how may the enormous per second expenditure of energy be reduced in any desirable amount at will, and compatibly with safety and the need of the operator?

Now it occurred to me that in case of the nitrogen explosives there may be a method of obtaining a continuity of power values within safe limits from insignificant amounts up to the highest admissible, by using some appropriate method of very cold storage. It is well known that at sufficiently low temperatures phosphorus and oxygen cease to react on each other, that fluorine is indifferent to hydrogen, etc. Is it not, therefore, probable that an explosive tendency will be toned down as temperature decreases; or that a molecular grouping which is all but unstable at ordinary temperatures will become stable at a temperature sufficiently low, and proportionately stable at intermediate temperatures. This is then

the experiment which I would like to see tried, the endeavor to get a gradation of power values ending in prohibitively large maximum, by the cold storage of explosives. If it succeeds, it seems to me that a motor yielding per pound weight not only all the power needed in the flying machine under any emergency will be forthcoming, but that large amounts of the inevitably dangerous source of such power may be taken aboard for use en route. The lower temperature of the upper air would here itself be an assistance.

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#### ABSTRACTS FOR EVOLUTIONISTS

##### ANTARCTIC APTERA

PROFESSOR GEORGE H. CARPENTER has recently published<sup>1</sup> a report on the Collembola of the South Orkney Islands, obtained by the Scottish national Antarctic expedition. In describing *Isotoma brucei* n. sp. he remarks that it is closely related to the Arctic and subarctic *I. beselsii* Packard: "In the general build of the body and the structure of the spring—particularly the form of the mucro, with its three prominent claw-like teeth—these two species of *Isotoma* stand apart from all other members of the genus." After discussing the distribution of the Antarctic Collembola, Professor Carpenter arrives at the conclusion that the ancestor of *I. brucei* must have reached the Antarctic lands during the secondary period, and that during all the time that has since elapsed, it has undergone no more modification than is expressed by the difference between *I. brucei* of the south and *I. beselsii* of the extreme north—a difference of much less than generic value.

##### UNIONIDÆ OF THE LARAMIE CLAYS

It is well known to naturalists that the eastern United States are the home of numerous remarkable groups of fresh-water mussels, which are absent from the western part of the continent, and to all appearances orig-

<sup>1</sup> *Proc. Roy. Soc. Edinburgh*, XXVI., Part VI. (1906).

inated in the same general region as that in which they now occur. Dr. R. P. Whitfield has published<sup>2</sup> accounts of a number of species of *Unio*, in the old broad sense, which have been obtained in the Laramie beds of Montana, and has called attention to their great resemblances to some of the more characteristic forms of the Mississippi and Ohio valleys. Placing these in their modern genera we find:

*Unio gibbosoides* Whitf. resembles *gibbosus* Barnes.

*Pleurobema æsopiformis* (Whitf.) resembles *æsopus* Green.

*Obliquaria letsoni* (Whitf.) resembles *cornuta* Barnes.

*Quadrula cylindricoides* (Whitf.) resembles *cylindrica* Say.

*Quadrula pyramidatoides* (Whitf.) resembles *pyramidata* Lea.

*Quadrula verrucosiformis* (Whitf.) resembles *verrucosa* Barnes.

*Obovaria retusoides* (Whitf.) resembles *retusa* Lam.

Thus several genera are represented, and as to the species, Dr. Whitfield says "some of them are so nearly like the living species, that it would do but little violence to specific features to state that they were the same." In view of these facts he adds: "I venture to state that these further western waters of the Laramie times were the original home of much of the *Unio* fauna of these [Mississippi and Ohio valleys] more eastern recent localities."

#### AN ANCIENT TYPE OF TREE

THE *Ginkgo*, now commonly planted in the states along the Atlantic coast, is of interest to all botanists on account of its curious foliage, and especially because it is the last surviving member of a very ancient and at one time widespread genus. Miss M. C. Stopes, in a description of the flora of the Inferior Oolite of Brora, Scotland,<sup>3</sup> points out that the *Ginkgo digitata* (Brongn.) of those beds is so like some examples of the living *G.*

*biloba* that at first sight no difference can be observed. However, by great good fortune the epidermis of some of the specimens of *G. digitata* is well preserved, and shows cells with even outlines, whereas in *biloba* the outlines of the cells are mostly wavy, the difference being considered of specific value.

#### HYBRID HUMMING BIRDS

MESSRS. JOHN E. THAYER and Outram Bangs have lately published<sup>4</sup> a short paper on hybrid humming birds, of which four are now known from California alone. These, occurring, of course, in the wild state, are all between different genera; but the genera in this group are many of them very closely allied. The fact and character of the hybridization in each case is determined wholly from a study of the skin, but the authors seem confident of their results. The presumed hybrids are:

*Selasphorus alleni* × *Calypte anna*.

*Trochilus alexandri* × *Calypte anna*.

*Trochilus alexandri* × *Calypte costæ*.

*Selasphorus rufus* × *Atthis calliope*.

#### CRESTED TITMOUSE HYBRIDS

*Bæolophus bicolor*, the tufted titmouse, ranges from the Atlantic coast to the Great Plains. *B. atricristatus*, the black-crested titmouse, ranges from the highlands of Vera Cruz to central Texas. At the line of junction of the humid and arid divisions of Texas these birds meet one another, and all sorts of intergrades occur. Dr. J. A. Allen has made an elaborate study<sup>5</sup> of these Texas forms, based on more than 200 skins, and arrives at the conclusion that it is a case of hybridization, not of geographical gradation. "The same localities furnish, at several known and quite widely separated points, birds of pure blood of both species, and intergrades having almost every possible combination of the strikingly dissimilar features of the two species." There is a genuine geographical variation in size observable in both species; the larger northern race of *B. atricristatus* is

<sup>2</sup> *Bull. Amer. Mus. Nat. Hist.*, XIX., and especially XXVI. (1907).

<sup>3</sup> *Quart. Journ. Geol. Soc.*, August 14, 1907.

<sup>4</sup> *The Auk*, July, 1907, p. 312.

<sup>5</sup> *Bull. Amer. Mus. Nat. Hist.*, XXIII., separates dated June 12, 1907.

separated as *B. atricristatus sennetti* Ridgway; the small Floridian form of *B. bicolor* has been named *B. bicolor floridanus* Bangs; while the maximum of the same species, found in eastern Kansas, could be called *B. bicolor missouriensis* (*Parus missouriensis* Baird) if it were worthy of a name, which Dr. Allen thinks doubtful. These differences are clearly geographic and are apparently dependent upon climate, directly or indirectly. It is quite possible that in part, at least, they represent what Tower calls "place-variation." In both species there is some difference in color accompanying that of size, and in the case of the black-crested titmouse this is quite marked. If the birds can be readily bred in captivity, they afford a fine opportunity for experimental work.

## AFRICAN ISOPODS

IN a descriptive account\* of the terrestrial Isopod Crustacea collected in Liberia by Dr. O. F. Cook, Miss Harriet Richardson describes four species of the genus *Ethelum* Buddenlund, stating that "all the species of this genus hitherto described are from the West Indies." It is interesting, as showing how little we know about tropical Isopods, to find that all the species of Eubelidæ collected by Dr. Cook, twelve in number, were new to science.

T. D. A. C.

## BOTANICAL NOTES

## SUNDRY BOTANICAL PAPERS

ELMER D. MERRILL, of the Biological Laboratory of the Bureau of Science, at Manila, has published in a recent number of the *Philippine Journal of Science* an interesting account of the flora of Mount Halcon on the island of Mindoro. He confines his paper to the spermatophytes, the vascular cryptogams having been catalogued by Copeland in an earlier number of the same journal. One species of *Agathis* (*Pinaceae*), three of *Dacrydium*, eight of *Podocarpus*, and one of *Phyllocladus* (*Taxaceae*) make up the list of gymnosperms. But nine species of grasses are recorded, including one *Bambusa*. The sedges

are scarcely better represented, having but ten species in the list, only one of which is a *Carex*. Of the palms there are but two species. The families *Juglandaceae*, *Fagaceae* and *Ulmaceae* are represented respectively by single species of *Engelhardtia*, *Quercus* and *Gironniera*. Of the *Rosaceae* and *Leguminosae* there are but three species each, while there is but one umbellifer. Even the great family *Compositae* is represented by only nine species. The largest family is the *Rubiaceae* with 27 species, followed with *Melastomaceae* (18), *Taxaceae* (12), *Myrsinaceae* (12), and curiously enough, the *Ericaceae* also with 12 species. In the latter there are two species of *Rhododendron*, one of *Gaultheria* (subscandent!) and eight of *Vaccinium* (mostly epiphytic!).

In the September *Botanical Gazette* Mary S. Young publishes an interesting short paper on the germination of the pollen of *Dacrydium*, one of the *Taxaceae*. The material was obtained in New Zealand.

Mr. Ellsworth Bethel, of Denver, and Dr. W. C. Sturgis, of Colorado Springs, have projected a series of papers to be published under the general title of "The Myxomycetes and Fungi of Colorado." The first number has appeared in the "Colorado College Publication" for September, and is entitled "The Myxomycetes of Colorado." It was prepared by Dr. Sturgis. He does not attempt to determine whether these organisms are plants or animals, "nevertheless," he says, "the study of these organisms is, and always has been mainly in the hands of botanists." After a few paragraphs on their structure, collection and preservation, microscopic examination, and literature, he gives a key to the genera known to occur in Colorado. This is followed by a fully annotated list of the species arranged under their genera. No attempt is made to characterize the genera otherwise than is done in the key, and only new and hitherto unreported species or varieties are described. About one hundred species and varieties are included.

"Linné and the Love for Nature" is the title of a pretty and appreciative paper by

\* *Smithsonian Misc. Coll.*, September, 1907.